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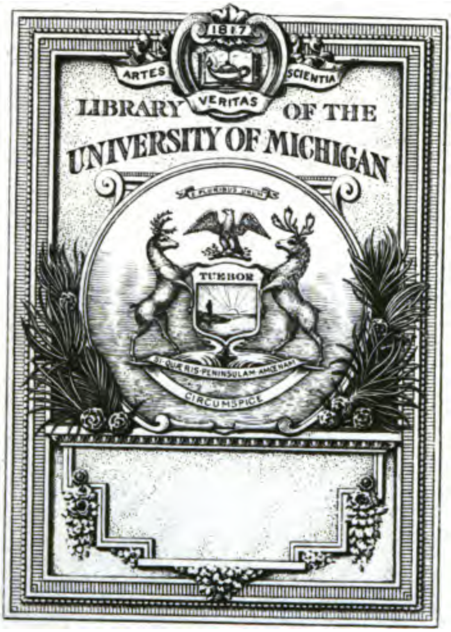
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THE
Daily Progreſs
AND
EXTRAORDINARY APPEARANCE
OF THE
CHICK IN THE EGG,
AND THE CHANGES WHICH TAKE PLACE DURING HATCHING,
IN THE
STEAM APPARATUS,

INVENTED BY J. H. BARLOW,
OF THE
EGYPTIAN HALL, PICCADILLY.

Including an interesting account of the Composition of Eggs,
with the Author's experiments thereon.

LONDON:
PRINTED FOR THE PROPRIETOR.
1824.

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.B26

Hetherington, Printer, 13, Kingsgate Street, Holborn.

General
Gift
1-13-31

AN EGG,

AND ITS COMPONENT PARTS.

An Egg is composed of a Yelk; a White; two Poles, or Chalazes; three Membranes—viz. one Membrane to the Yelk; and two others common to the Egg—and, lastly, a Shell; to which two things may be added, which cannot properly be ranged with the other parts of the Egg; one of which is a small cavity, in the largest end of the Egg, the other a little noble, spot, or cicatrice, affixed to the superfices of the Yelk.

THE SHELL.

THE Shell is a hard, slender, friable, and porous tegument, having several colours—viz. white, pallid, red, spotted, and speckled. Hens' and pigeons' Egg-shells are white; the water-fowl's pale; the hawk's red, or vermillion; pheasant's and partridge's spotted; and most others speckled. All Eggs have not a shell, as some hens *(though rarely)* lay Eggs without a Shell (called rear or cocks' Eggs.)

THE WHITE.

The White is a cold, stiff, transparent liquor, of different thickness—for, at both the obtuse and acute ends of the Egg, it is more fluid than in other parts, and more abundant at the large end of the Egg than the small—embracing the Yelk round about. There are, also, two distinct qualities of the White in the same Egg, involved in a peculiar membrane of their own; one thin and fluid, the other thick and viscous, and dyed of a deeper colour; and which, during the process of hatching, changes to a waxy yellowish colour.

THE YELK OR YOLK.

THE Yelk, so called from its colour, is the softest juice that is in the Egg; round and confined within a very thin membrane, in the middle of the White, and of divers magnitude, according to the size of the bird. Water-fowls have a larger Yelk, and land-fowls a larger White. The Yelk and White are of a contrary *nature*, *colour*, and *power*: the Yelk, like our earth, is deposited in the centre; the White, as the air and water which surround it.

THE
POLES OR CHALAZES,
SPECKS OF PEARLS, OR HAIL STONES.

THE Poles, Chalazes, specks of Pearls, or Hail-stones, (which the Italians call Galludura, and we the Treaddle) are different names for the same thing. There are two in every Egg; one seated in the large end, the other in the small; the major part of which is found in the White, but they adhere more closely to the Yelk, and are annexed to its membrane. They are oblong bodies, more congealed and opake than the White itself, and as transparent as Hail, from which they borrow one of their appellations. One of the Poles is larger than the other, and more distinct from the Yelk towards the large end; they are made up of three knotty substances, like Hail-stones, laying behind each other.

Fabricius, like many other persons, was mistaken in supposing the fabric of the chickens is created by the Treaddle, as we term it; for if so, there would be two chickens in every Egg, which is never the case; for no one ever saw any formation or progress of a chicken but at the large end of the Egg. The intent of the Poles or Chalazes shall appear more clearly hereafter.

THE CAVITY.

In the large end of the Egg, near the Shell, in the inside, you may discover a small Cavity or hollowness, which is sometimes exactly at the top of all; and sometimes inclining to one side, almost directly opposite the Chalaze, at the small end. The figure of it is, most commonly, circular; but in a goose or duck Egg, it is not so precisely round. This Cavity you may plainly see, appearing like a cloudy spot. If at night you look through a new-laid Egg, against a candle, it is but small; but, as the Egg grows staler, and the weather hot and oppressive, it increaseth daily. Some persons, that pretend to be cunning in this matter, prognosticate, if the cavity be directly at top, the chicken will be a cock:—if inclined to the side, it will be a hen. But this is most certain, if the cavity is small it signifies a new-laid Egg, if large a *stale one.*

THE CICATRICE.

THERE is a very small white circle, embracing the coat of the Yelk, which *Fabricius* calls *Cicatricula*; but he says it is *rather* a *blemish* than a part of the Egg. This is a very little spot, like the ball of a bird's eye, being white, flat, and round; *(and all Eggs have this, whether fertile or barren, even from their very first origin in the Yelk)* it is the relique of a stalk broken of from the Yelk, by which it was incorporated to the cluster of Eggs in the ovary.

Fabricius is extremely wrong in thinking this Cicatrice to be utterly useless, for it is the most material part in the whole Egg, for whose sake all the other parts are created, and the original and foundation, out of which the chicken itself is formed.

THE

DIFFERENCE of EGGS.

An Egg is that thing, one part of which doth constitute an animal and the rest doth nourish it, when it is constituted; and of this kind are the Eggs of ants, flies, spiders, some kind of butterflies, and many other small Eggs, or, as some authors style them, little worms. *My chief object, however, is to treat of hen's Eggs, especially during the progress of hatching:* one of three kinds only will produce chickens—viz. *the fecundated new-laid Eggs;* the other two are either barren or have lost their generative virtue by age.

Having already treated on the generation of Eggs, as a prelude to the artifical mode of Hatching by *Steam*, a task, though useful and pleasant, which will be always attended with difficulties—for nature's rudiments are involved in obscurities, and so perplexed with subtilties that they delude the most intense industry, as well as the sharpest eye; nor can we discover the whole secret recesses and dark principles of the fabric and generation of the Chick in the Egg.

NEW LAID EGG.

If a new-laid Egg *(which has not been set on)* be opened at the large end, and some of the Shell broken off, and some of the White removed to expose the Yelk, there will be seen at the end, and rather towards the side of the Yelk, an indistinct white spot—viz. the *Molecule* or *Cicatricula*. This is the part in which the rudiments of the chick first appear: this spot, in a stale as well as new-laid Egg, is found in the same consistence, magnitude, colour, and site; but only the fruitful will produce animal life; the barren undergo no change in hatching, the stale become addled.

FIRST DAY.

Scarce has the Egg been exposed to the heat of the Oven (or the incubation of the hen) twelve hours, when this spot is presently dilated and widened like the pupil of the eye--when some lineament of the embryo chick begins to appear; on this day the white line is extended, and the first rudiments of the brain and spinal marrow are formed, surrounded by a membrane: and yet this first principle of the chick was never yet, to my knowledge, observed by any man.

SECOND DAY.

On the Second Day of hatching the Cicatricula is dilated and enlarged to the magnitude of a pen or lentil, and is divided into circles (as if drawn by a pair of compasses) which have a small white point for their centre. This is the first day's progress of the Egg towards a chicken—the first platform of the future building. The head is turned to the left; and a portion of the heart, and the pupil of the eye, is seen through a microscope.

THIRD DAY.

When two days have passed away the aforesaid circles of the spot, or Cicatricula, are more ample and conspicuous, being of the breadth of a finger; between these circles is contained a most bright refulgent liquor, clearer than any chrystal in the world. At the end of this day you will perceive a great metamorphosis. A wonderful alteration takes place almost every hour; and, at the close of the day, the Egg beginneth to step from the life of a plant, in which there is no motion, to the life of an animal, in which there is movement; for now the hem of the spot begins to purple and blush, being encompassed with a slender line of blood, in the form of a butterfly.

FOURTH DAY.

About the seventy-second hour, in the centre, there leapeth a capering point of blood; so exceedingly small that, in its dilatation, it flashes like a spark of electricity, and, upon its contraction, it is too subtle for the eye, and disappears. So slender are the rudiments of creatures' lives, which the plastic faculty set on foot by an indiscoverable beginning. At the end of this day the beating spot hath animal shape and motion, with two hollow threads, like veins, full of blood, which is carried crooked to the purple lines on the hem; scattering as they pass many fibrous branches, all of which spring from the same original—as the boughs of trees from the same trunk. In the contraction and dilatation the pulsation keeps time, by dilating and resigning the blood again.

FIFTH DAY.

THE animal is changed from the shape of a maggot, and approaches the form of a chicken; the two wings, and the two legs, may be seen; and, on the head, two knobs for the brain, and one for the bill. The head is distinguished into three vesicles, or little bladders, round and blackish, (whereof the first is largest)—this is the eye; in whose centre the pupil is discovered like a chrystal point, under the upper vesicle, part of which is hidden in the brain; yet in all these you find nothing but clear water. The rudiments of the body represent the chine of the back; to which sides, the legs, and wings, jut out from the maggot; and the vessels do now plainly express the navel.

SIXTH DAY.

The three knobs of the head do now more plainly appear, and the coats of the eyes are more distinct; also the legs and wings do bud forth; the form of the chicken's rump is yet no other than that which is seen in all other animals; viz. a round slender tail; the beating of the heart is more distinctly seen, and the rudiments of the liver and lungs are discovered, as also the bill, all appearing exceedingly white; but the heart exposes itself first to sight; and the lungs before the liver or the brain; but, before all, the eyes are visible, because of their largeness and black colour; the vesicles extend themselves over great part of the Yelk to enclose the embryo.

SEVENTH DAY.

THE fœtus moves, and gently tumbles and stretcheth out the neck; though nothing of the brain is yet to be seen, but merely a clear water shut up in a bladder; the viscera and intestines being now formed, but deprived of the thorax and abdomen; (the heart itself beating by the expansion and contraction of the blood) the claws are distinguished; and the fœtus begins to form a chicken—it opens the bill and kicks; lastly, all the parts are delineated, especially the eyes; but the viscera are too obscure to be seen. What follows from one day to the other comes to pass sooner in some Eggs than in others.

EIGHTH DAY.

On the Eighth Day all things are clearer; and each of the particular parts are visible—viz. the eyes, wings, legs, the divided claws of the feet, &c. &c.: now the fœtus stirs itself; the chicken is formed and found complete, there being no addition to be expected for a day or two, but only the growth of the tender parts; the more they increase the white wastes for the nourishment of the chicken, which is increased also by the veins—extending over the Yelk as ivy to a tree: the principal vein represents the navel.

NINTH DAY.

Notwithstanding all this, and a variety of opinions as to the quality of Eggs proper for hatching, I have observed many Eggs at a time. Some that are forward in hatching, better grown, have all the parts in them; *(others will represent them less distinct; which accounts for the many failures in hatching, or sitting under a hen.)* The Cavity, indeed, is dilated on the seventh or eighth day, and the Yelk sprinkled over with veins; also, a maggot in the middle of the White, together with the rudiments of the eyes, and other things which come to pass in other Eggs about the fourth or fifth day—yet there was no pulsation at all; nor could I find the trunk or root out of which the veins rise: and, therefore, I justly concluded the Eggs are feeble and endowed with a sickly generative power, which occasions death; for when the vital spirit departs it corrupts with the first order of generation.

TENTH DAY.

WHATEVER is visible on the eighth day is fully described, that little, or nothing, remains to be added; all the chicken is seen, and all pellucid—the head is larger than all the body—the eyes stick fast in the head, being yet unfurnished with an eye-ball; and yet it is no difficult task to discover the distinct coats of the eye; which if plucked out, you find therein black eye-balls, larger than peas, from which, if you take off the skin, there flows a white cold humour, very refulgent, if you hold it in the light; and, beside that humour, there is nothing in the whole head from the seventh to the tenth day.

ELEVENTH DAY.

THE viscera or entrails also appear; as also the heart, lungs, and liver, none of which hath a firm consistence; and the veins that proceed from the heart to the navel, one of which passeth to the membrane containing the Yelk, which is more fluid and dissolved than it was before; for, while the chicken grows, part of the Yelk is above and part below; but the White, being in the middle, is liquid, and the White is also above that lower part of the Yelk, as it was under it before.

TWELFTH DAY.

And now you may plainly see the veins accompany the arteries, as well those which tend to the White, as those which pass the Yelk. The Yelk now begins to dissolve; not all of it, but that which is uppermost; nor do the sprigs of veins run over the whole Yelk, but a part only, which resumes melted wax in consistence and colour; so also the veins which extend to the White have some arteries for their companions. The White is dissolved into a white moisture (called the Colliquamentum) which surrounds the chicken, swimming in the middle of it, which lieth between the two divisions of the Yelk. The feathers begin to shoot as black points; but the eyes have not as yet got a lash.

THIRTEENTH DAY.

The upper part of the Yelk is more liquid and dissolved; the parts grow larger, more tumid, and softer; the White sinks down having grown less viscous, thicker, and yellow—viz. that part of which is not transformed into the Colliquamentum. The Yelk being now larger than it was at first, it is evident it does not as yet serve for nutrition, but is afterward intended for that purpose; for, by the distribution of the veins, the fœtus is at first nourished by the White alone; afterwards by the Yelk: for the most tender fœtus, while a small maggot, is fed with the finest diet; but, when grown more hearty, it is fed with more substantial food, proper for its age and strength.

FOURTEENTH DAY.

All parts of the chicken are now enlarged; the heart is now concealed in the cavity of the breast; but the other entrails are to be seen still, obtruding out of the body of the chicken; and those that were before exposed, cannot now be seen, but by opening the breast. The chicken is now clothed in plumes; the apple of the eye distinct; and the eye-lids are plain to be seen; likewise, the Membrana Nictatoria, or membrane moving the eye-lid—which is a membrane peculiar to all birds, by which they cleanse their eyes.

FIFTEENTH DAY.

THE brain is covered by the skull; and the tail has the form of a rump; the entrails, which were white before, put on by degrees a ruddy flesh colour; the heart is now entered into the cavern of the chest, and is guarded by the sternum, or *breast bone;* the brain grows firm and solid, in the arch of the cranium, or skull; one of the two larger vessels is an artery, *(as the pulse discovers)* springing from the great artery.

SIXTEENTH DAY.

THE other is a vein, conveyed from the Yelk, by the intestines, into the Vena Porta, or Gate vein, at the concave part of the liver; for the other trunk of the umbilical vessels, having received its branches from the White, is inserted into the Vena Cava, or hollow vein, near the basis of the heart. As these parts grow daily more conspicuous—so the greatest portion of the White is daily consumed; but it is not so with the Yelk which is, at this period, almost entire, and of the same bulk it was the first day.

SEVENTEENTH DAY.

Sometimes, on the Seventeenth Day, if the weather is hot, at the time the hen sits, or the Egg is exposed to a sudden flush of heat in the oven, if the chicken be strong and healthy, and hear others chirping by his side, he will, by a sudden effort, make the first puncture of the shell, *(which is always done by the chick itself)* in which case he seldom survives, for though he utters repeated cries to be set at liberty, it is ex-extremely dangerous to attempt to relieve him, as nature has not as yet performed its functions. For a more elaborate description of the chick in the Egg, and the changes which take place during Hatching, see Sir Evererd Home, and Doctor Prout's Experiments in the Philosophical Transactions of the Royal Society of London 1822, part II.

EIGHTEENTH DAY.

The chicken now possesses a greater room in the Egg than all the other parts contained therein, and is completely down-feathered; and the larger the chicken grows the more the white diminishes. And it is worthy the observation, that the membrane of the colliquamentum, which is joined to the outward coat, doth now likewise contain all the yelk. The chicken is rolled up like a ball: he sometimes sleeps; but when awake he respires and cries; and making a rotatory movement, pierces the shell entirely round with repeated strokes of his bill.

NINETEENTH DAY.

You will plainly hear the chicken bustling and kicking out his legs. He will stare upon you, and in his manner, cry and complain. The white is now entirely consumed: there only remains a white and muddy substance, like the egg-shell softened and dissolved; and the liquor which wetted his feathers being too much exposed to the air, will often grow dry, and glue his feathers to the membrane, which is the wrapper of all the outward parts of the chicken; and in this case he must die, if a helping hand does not extricate him from the shell, by doing what he is utterly unable to do for himself.

TWENTIETH DAY.

Before exclusion, or the birth of the chicken, every part must have performed its functions, agreeably to the laws of nature: his outward parts are disposed admirably; in such a regular and constant way, that changing the position of the Egg does not injure the chick, as he is in the form of a complete ball, his head supported under his wing, which enables him to crack the shell with greater force, until he has fractured the whole circumference, and by a sudden effort, will, in most instances, completely cup the large end of the shell into the smallest.

TWENTY-FIRST DAY.

A Chicken, after it is exposed to the heat of the Hen, or the Oven (after being hatched Twenty four hours, (is shown beautifully covered with down, and now only requires natural food, air, and exercise, with the warmth of the Parent Bird, or any foreign *heat* to cherish and protect it.

How wonderful is it that there should be in an Egg, the principle of life, of a living creature: that all the parts of an animal's body should be concealed in it, and require nothing but warmth to unfold and quicken them to life. All this is according to order, and carries its own reason with it.

H. Hetherington, Printer, 13, Kingsgate Street, Holborn.

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